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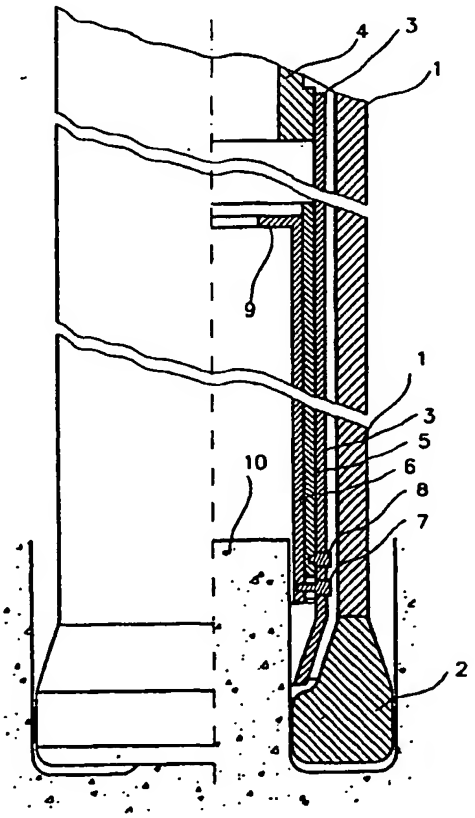
(54) Title: A DEVICE FOR CORE DRILL

(57) Abstract

A core pipe (3) for coring or core drilling, especially with sampling in connection with oil wells, wherein the core pipe (3) is rotatively suspended from a rotary drill pipe (1) operating a bit (2), and further provided with internal, telescopically disposed core pipes (5, 6), rupture pins (7, 8) retain the core pipes (5, 6) in the initial positions thereof. When core material (10) strikes against a stop (9) at the upper end of the core pipe (6), or wedges itself or get stuck within the core pipe (6), the rupture pin (7) is cut off and the core pipe (6) follows the core material (10), the core pipe (6) then sliding within the core pipe (5). Should the core material (10) get wedged in the core pipe (5) beneath the core pipe (6), rupture pin (8) is cut off, the core pipe (5) then following the core material (10) upwardly within the outer core pipe (3).



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A DEVICE FOR CORE DRILL

The invention relates to a core pipe for a core drill.

Core samples are an important information source in geological analyses, and such samples are frequently used in connection with the drilling for oil. Core samples are fetched from the ground by means of a core drill provided with an internal core pipe. In connection with oil wells, it is usual to use a core drill capable of taking samples having a length of up to 30 metres. However, in some geological formations, it is difficult to achieve core samples having full length, the core getting stuck in the core drill, and the sampling has to be interrupted.

A typical core drill for use in oil wells has an external rotating drill pipe driving the bit, and an internal stationary core pipe. The core pipe is located straight above the bit and, at the upper end thereof, it is suspended from the drill pipe in a mounting allowing the drill pipe to rotate in relation to the core pipe. An intermediately open bit is used and, during drilling, core materrial comes up through the bit and passes further upwardly within the core pipe. The core pipe has a slightly larger internal diameter then that of the opening in the bit, such that some clearance exists between the core material and the core pipe. Often, wedging is caused by breakage of the core at transition(s) between various zones of the ground. As the breakage surface seldom is perpendicular to the core axis, the axial force

causes parts of the core to be pressed outwardly against the wall of the core pipe, resulting in the core material becoming wedged within the core pipe. Bulging clay or loose sand may also cause the core to be stuck. The drilling equipment must be pulled out from the hole, and stuck core material must be removed before the sampling may be continued. Such extra operations extends the operational time with samling substantially, and significant further costs accumulate.

The object of the invention is to provide a core pipe, where wedging can be allowed in a certain degree, without having to interupt the coring operation.

The object is achieved by the features as defined in the following claims.

An example of an embodiment of the invention is described in the following, reference being made to the attached drawings, in which:

Figure 1 diagrammatically and sectioned in the lower portion shows a drill pipe having an internal telescopic core pipe, as seen in the initial position;

Figure 2 diagrammatically and sectioned shows the telescopic core pipe after core material has got wedged at two places.

In figure 1, reference numeral 1 denotes a drill pipe having a bit 2 for coring operation (core drilling). A core pipe 3 is suspended from the drill pipe 1 in a fastener 4, which may rotate in relation to the drill pipe. The fastener 4 is a part of a usual known suspension device (hanger) for core pipes and, therefore, the fastener 4 is not shown i detail. Internally within the core pipe 3, two further core pipes 5 and 6 are concentrically and telescopically disposed. The core pipe 5 is adapted to be displaced axially within the core

pipe 3, and the innermost core pipe 6 may similarily be axially displaced within the outer core pipe 5. In the initial position, the internal core pipes 5 and 6 occupy positions at the lower end of the outer core pipe 3, and they are kept in place in relation to the core pipe 3 by rupture pins 7 and 8. At the upper end thereof, the core pipe 6 is provided with a stop 9 adapted to prevent core material 10 from passing.

When drilling, the core material 10 will pass through the bit 2 and into the inner core pipe 6 and further upwardly to rest against the stop 9, so that axial force is transferred to the rupture pin 7 which then is cut off. The core pipe 6 will thereafter follow the core material 10 upwardly, the core pipe 6 sliding within the core pipe 5. Should the core material 10 become wedged within the core pipe 6 prior to the core material 10 coming to rest against the stop 9, the ruture pin 7 will be cut off earlier because of the axial force transferred through the wedging, and the core pipe 6 will follow wedged to the core material 10. Therefore, the drilling may be continued.

If the core material 10 also should get stuck to the core pipe 5, below the lower end of the core pipe 6, the rupture pin 8 is also cut off. Then, the core pipe 5 will, in the same way as the core pipe 6, follow the core material 10 upwardly, the core pipe 5 sliding internally within the core pipe 3. Therefore, the drilling may still be continued. A similar situation is shown in figure 2, in which the core material 10 has become stuck in both the internal core pipes 5 and 6.

Should a third wedging occur, namely against the outer core pipe 3, the situation is the very same as with known core pipes, and the coring has to be interrupted. In particularly difficult formations, it might be of interest to widen the telescopical action, adding more internal concentric core pipes, thereby enabling a larger number of wedgings to be

handled.

The rupture pins 7, 8 are dimensioned for the force the core is assumed to stand before it is destroyed. Instead of the rupture pins 7, 8, the core pipes 5, 6 might be kept in their initial positions by means of flux material such as glue or soldering flux adapted to be cut off upon the occurence of a predetermined axial force. Alternatively, the core pipes 5, 6 may be attached in the initial positions thereof to the core pipe 3, using a friction connection, e.g. in the form of a press fit adapted to slide at a predetermined axial force.

Claims

1. A core pipe (3) for coring operations, especially with sampling in connection with oil wells, wherein the core pipe (3) is rotatively suspended internally within a drill pipe (1), so that the drill pipe (1) can rotate without the core pipe (3) rotating, characterized in that the core pipe (3) is provided with one or more internal, concentrically arranged core pipes (5, 6), each of the internal core pipes (5, 6) being adapted to be displaced axially within the closest external core pipe, and wherein the innermost core pipes (5, 6) are retained in initial positions close to the lower end of the outer core pipe (3) through an attaching device adapted to release when the core pipes (5, 6) are subjected to a predetermined force.

2. A core pipe (3) as set forth in claim 1, characterized in that the innermost core pipe (6), at the top end thereof, is provided with a stop (9) adapted to prevent core material (10) from passing.

3. A core pipe (3) as set forth in claims 1 and 2, characterized in that the innermost core pipes (5, 6) are retained in initial positions close to the lower end of the outer core pipe (3) by means of rupture pins (7, 8) adapted to be cut off upon the occurence of a predetermined force.

4. A core pipe (3) as set forth in claims 1 and 2, characterized in that the innermost core pipes (5, 6) are retained in initial positions close to the lower end of the outer core pipe (3) by means of an aggregate or flux material adapted to be ruptured upon the occurence of a predetermined force.

5. A core pipe (3) as set forth in claims 1 and 2, characterized in that the innermost core pipes (5, 6) are retained in initial positions close to the

lower end of the outer core pipe (3) by means of a frictional connection adapted to be overcome upon the occurence of a predetermined force.

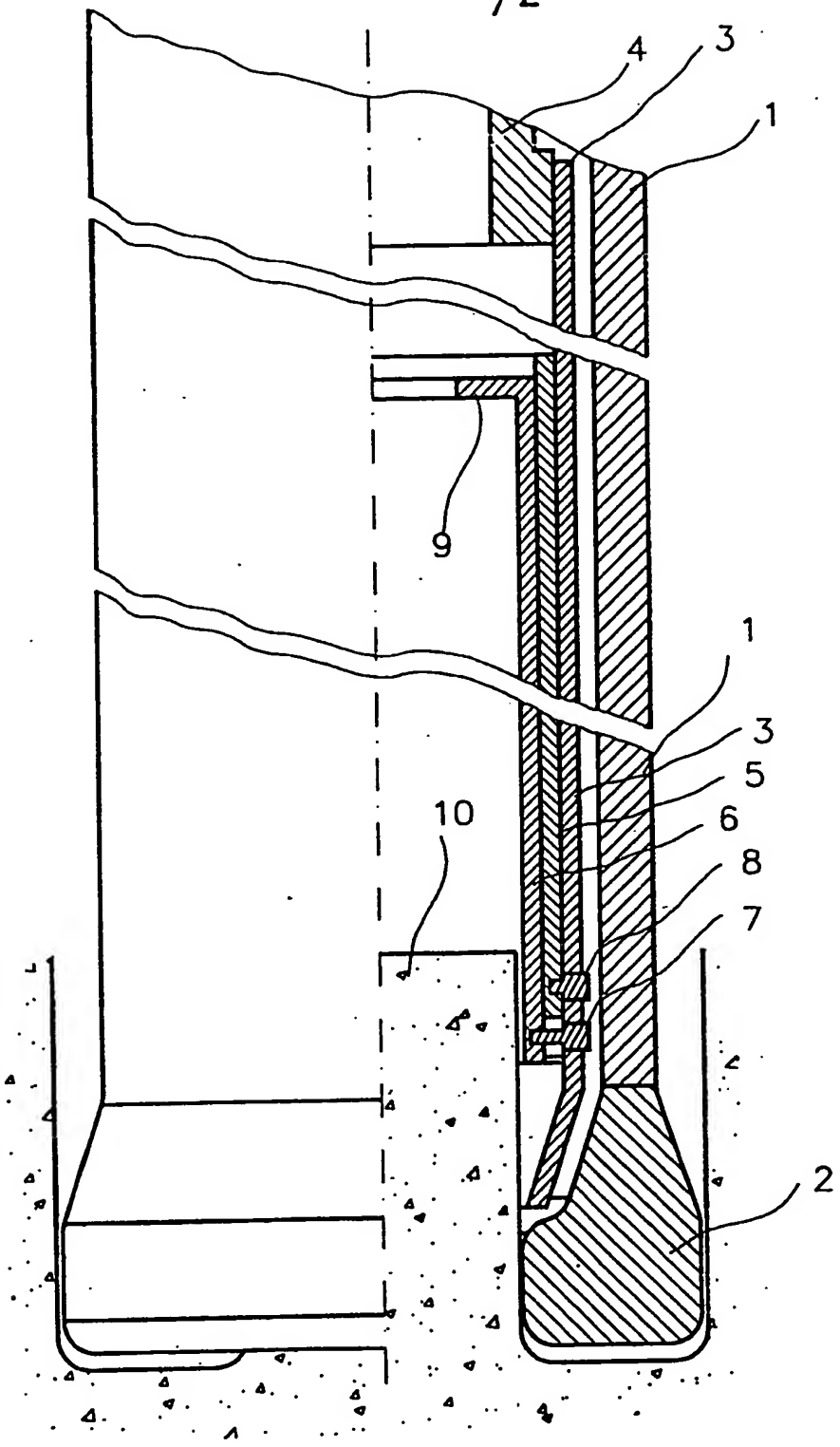

Fig. 1

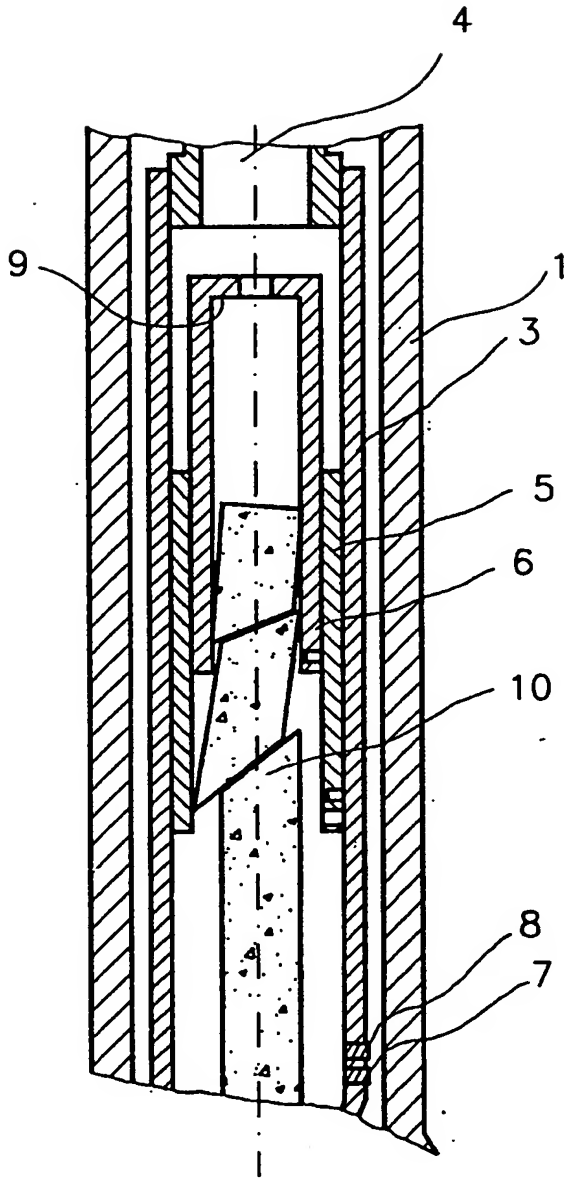

Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO 94/00095

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: E21B 25/00, E21B 49/02
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: E21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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CLAIMS, WPAT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 2032423 (L.A. LARSON ET AL), 3 March 1936 (03.03.36), the whole document --	1-5
A	US, A, 2929612 (F.L. LE BUS, SR), 22 March 1960 (22.03.60), the whole document --	1-5
A	DE, B, 1167286 (BERGWERKSVERBAND G.M.B.H.), 9 April 1964 (09.04.64), the whole document --	1-5

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Date of the actual completion of the international search	Date of mailing of the international search report
26 August 1994	02 -09- 1994
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR, A, 1474299 (J.M. HUBER CORPORATION), 24 March 1967 (24.03.67), figure 1, details 36-38 and corresponding text in columns 2 and 3 --	1-5

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/07/94

International application No.
PCT/NO 94/00095

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 2032423	03/03/36	NONE	
US-A- 2929612	22/03/60	NONE	
DE-B- 1167286	09/04/64	NONE	
FR-A- 1474299	24/03/67	NONE	